Prunus avium in Europe: distribution, habitat, usage and threats

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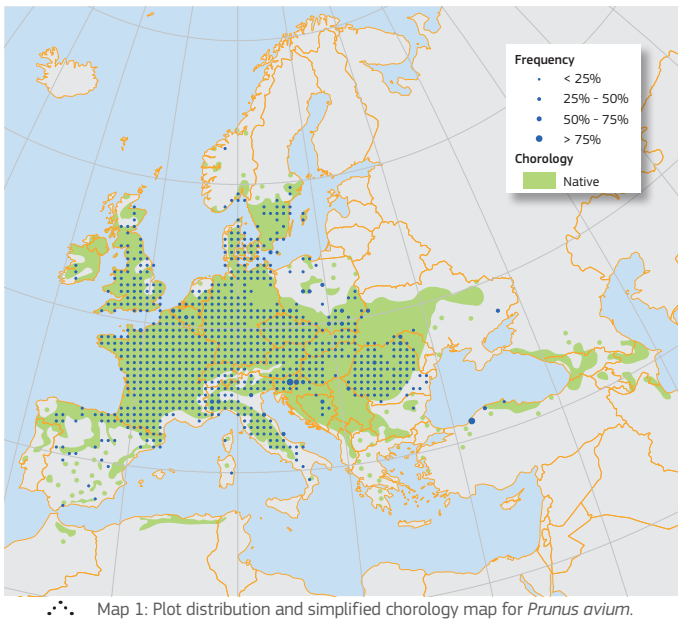
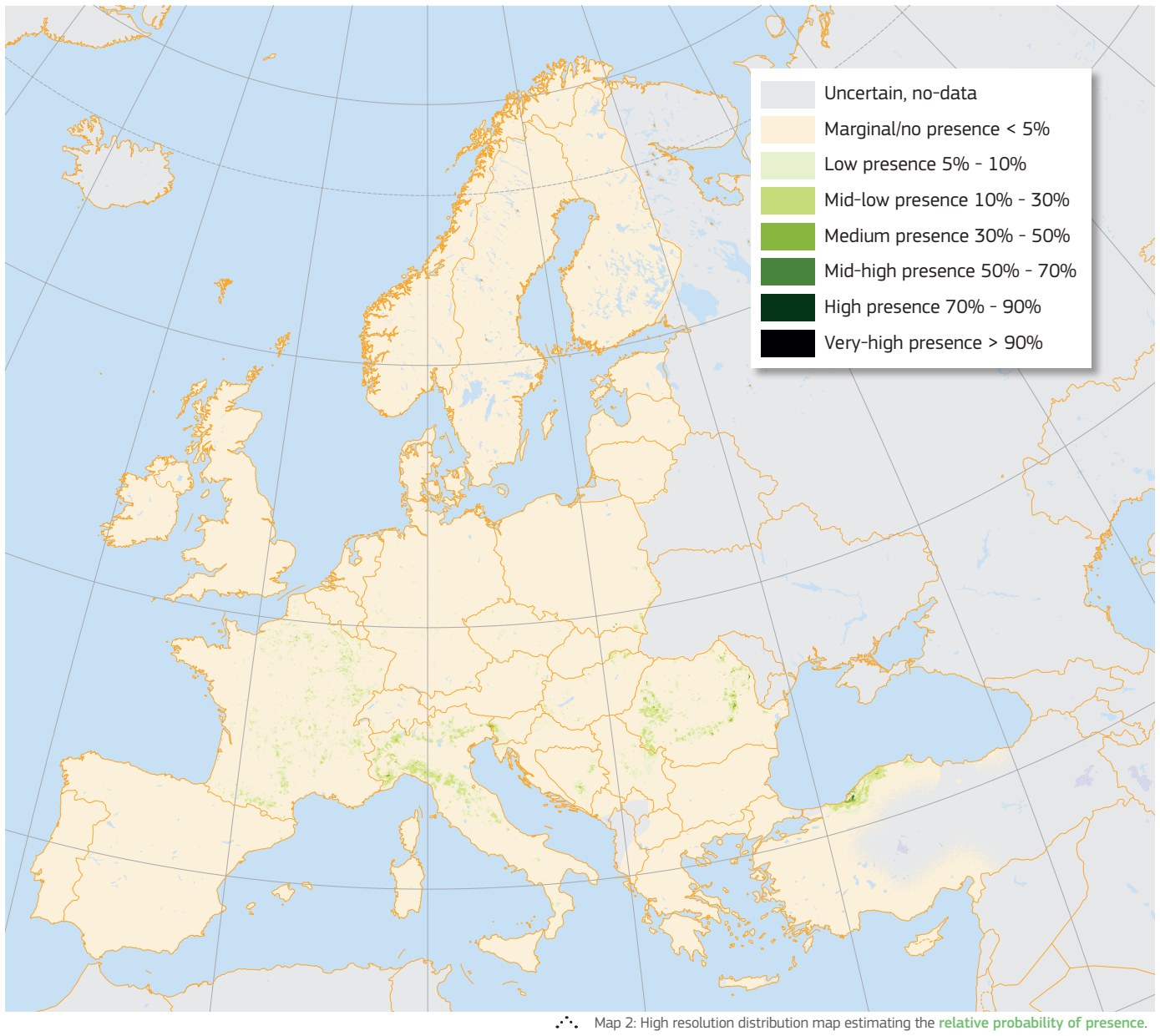
***Prunus avium* (L.) L., known as wild cherry, is a medium sized, fast growing and rather short-lived deciduous tree. The wild populations, described here, belong to the typical subspecies *avium*, whereas the cultivated forms are distinguished as subsp. *duracina* and subsp. *juliana*. The early large white flowers are clustered on spur shoots and give rise to edible purplish small drupes with a bitter-sweet taste. The main stem trunk is usually very straight with a characteristic grey-reddish-brown "cherry-bark" that is shiny with large horizontal lenticels and horizontally peeling pattern. Wild cherry occurs as a minor component in many types of temperate broadleaved and mixed forests. The wild form is a mainly European species and served as the origin of all cultivated forms. It is a very popular ornamental fruit tree, and the hard, reddish-brown timber is one of the most valuable in Europe.**

Wild cherry (*Prunus avium* (L.) L.) is a fast-growing but short-lived (100-150 years), medium sized deciduous tree, which grows to 15-32 m height and with a stem diameter of up to 90-120 cm[1]. The species mostly develops single, straight trunks with a thin, smooth purplish-grey bark that becomes grey-brown with horizontal fissuring and peeling when old. Young trees grow with a strong **apical** control developing a straight trunk and an erect-pyramidal "coniferous" crown shape, becoming broader and rounded on single old trees or conical in individuals in forest stands[2, 3]. Young shoots are shiny, pale grey to purplish-brown, and have large, reddish brown and protruding ovoid-ellipsoid, **glabrous** winterbuds at the branch ends arranged in whorl-like form. Stem wounds produce a resin-like, amber coloured odourless gum[4, 5]. The leaves change colour from light green in spring over dark green in summer, and to yellow, orange-red, scarlet or pink in autumn. They are alternate, pendulous, simple and elliptic-**ovate** to **obovate** acute in shape. The leaf margins are mildly **serrated** with slightly rounded teeth. There are conspicuous pairs of dark-red glands at the 2-3.5 cm long petiole below the lamina. Leaf size is approximately 5-15x3-8 cm. They are usually dull, glabrous-rugose above and sometimes weakly downy at the 8-15 pairs of secondary vein ribs beneath[1, 2, 5]. Wild cherry flowers are **allogamous**, **actinomorphic**, about 2-2.5 cm in diameter, white, **hermaphroditic**, insect pollinated, and are arranged in **racemose** clusters of 2-5 flowers on short spurs (**brachyblasts**) with multiple apical (inserted at tips) buds; of which the distal (uppermost) bud is vegetative and continues growth, while the others bear new **inflorescences**[3]. Flowers are pollinated mainly by honeybees, wild bees and bumblebees and the trees are generally not self-fertile[1, 2, 5]. Individual trees have a relatively short life span of 100-120 years at maximum, and can start fruiting when 10-15 years old 6. In Central Europe, flowering starts earliest in late March and occurs until May, while individual trees are in flower for about one week[1, 2, 5]. Fruits are purplish black drupes, sub-globose to ovoid, 1-2 cm in diameter with a smooth, fleshy, and bitter-sweet edible endocarp[1, 2, 5]. Ripe fruits occur from late spring until summer and are consumed and dispersed mostly by birds such as pigeons, starlings, thrushes and jays, but also by larger vertebrates like foxes, badgers or wild boar[2, 6].



Map 1: Plot distribution and simplified chorology map for *Prunus avium*. Frequency of *Prunus avium* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *P. aviumis* derived after EUFORGEN[19].



Map 2: High resolution distribution map estimating the **relative probability of presence**.

Cutivated cherry tree in orchard.
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Distribution

Prunus avium occurs naturally throughout the temperate forest regions of Europe, Anatolia, and adjacent regions of the North African Maghreb, and western Asia[1, 2, 5]. The distribution area extends northwards to the British Islands and to southern Scandinavia, where it is difficult to tell apart native from naturalised populations. The northern natural range limit is reached at about 55° north parallel[1]. In the south the range extends to North Africa, South Spain, central Italy, and the Balkans. In these regions it is strictly confined to increasingly scattered high altitude populations in humid situations[1, 2]. The easternmost parts of the natural range include the Caucasus and the Elburs mountains of North Iran, where the species is reported to occur up to elevations of 2 000 m. In the Alps it occurs up to 1 700 m and reaches 1 900 m in South-East France[7]. The general altitudinal distribution stretches from the planar to submontane altitudinal zone. In the highest, montane locations wild cherry often grows only as a shrub[7]. Limiting factors for wild cherry distribution are mainly related to rainfall in the summer period in the south and colder conditions in north and east Europe[8]. Beside the circumscribed native distribution, this *Prunus* is widely planted and naturalises successfully in deciduous forest habitats and shrub land, especially in temperate regions of Northern Asia and North America[1, 2].

Reddish-brown bark with large horizontal lenticels in stripes.
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Habitat and Ecology

Wild cherry is a **mesophytic**, comparatively shallow-rooting, light demanding species, which can grow in quite different soil types. However, it favours deep fertile soils with a good water supply. The tree does not tolerate heavy clays, waterlogged or poorly drained sites and can be sensitive to drought[1, 2, 5]. Main habitat type is semi-shade, open deciduous woodland or scrubland especially at edges, glades and clearings, where this tree essentially occurs as a rare and scattered pioneer species[1, 2]. The pioneer colonisation strategy is realized as a first generation establishment via seedling recruitment, potentially followed by sometimes extensive vegetative growth via root suckering. With its ability for coppice

shooting and sucker formation as well as its rapid juvenile growth, wild cherry possesses competitive advantages in early succession stages. In natural forest stands the species is usually replaced by climax tree species during ongoing succession[9, 10]. In its European main distribution range it is a frequent element of several mixed deciduous forests type alliances of the class *Querco-Fagetea*, such as ravine forests (*Tilio-Acerion*), oak-Hornbeam forests (*Carpinion betuli*), lowland beech forests (*Fagion*), and riverine floodplain forests (*Alno-Ulmion*)[11].

Flowers are arranged in clusters inserted at tips of buds.
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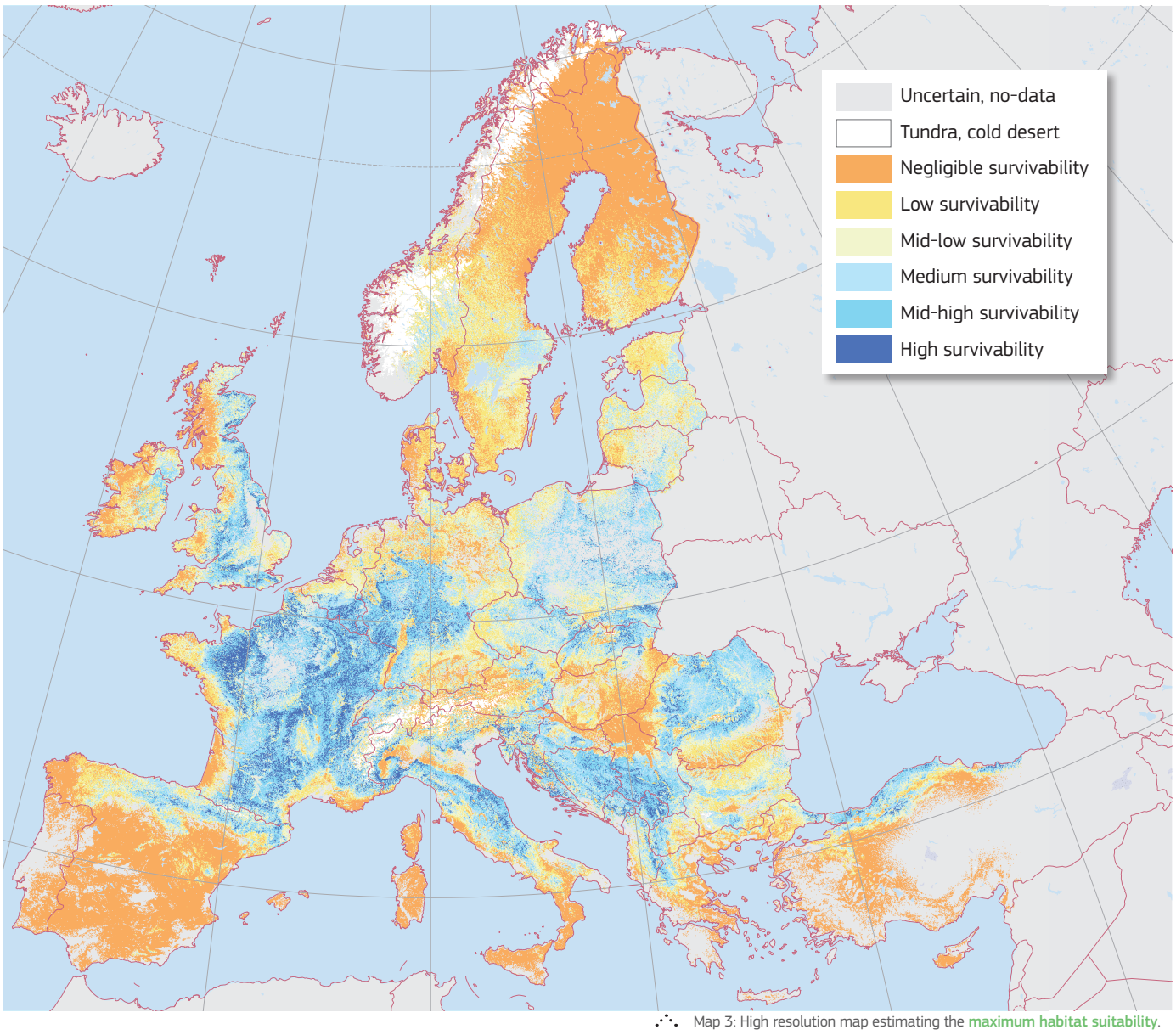
Importance and Usage

Wild cherry fruits have been a source of food for humans for several thousands of years[1, 5]. Today it is cultivated as a fruit tree in temperate regions all over the world. Beside human fruit consumption in the cultivated subspecies, wild cherry is also one of the most important European hardwood trees, with a valuable solid and dense wood that is highly sought after for panelling and cabinet-making, and also suitable for producing parquet floors and musical instruments. Today, veneer production is the main use of wild cherry timber[6]. Beside its usage as an ornamental landscape tree, this tree is also an important food source for many species of songbirds and insects[2, 5]. The distribution range of wild cherry, and even its suitable potential range for silvoarable agroforestry[12], overlaps with many areas in Europe with high erosion rates such as the European mountain systems[13]. Its adventitious roots are suitable to be exploited for deep reinforcement and soil strength enhancement[14] as well as for soil bioengineering to increase the stability of slopes and mitigate erosion[15].

Threats and Diseases

Prunus avium develops a rather shallow heart-shaped root system with far reaching lateral roots in top soil horizons, rendering it quite vulnerable to wind-throw. Additionally it is relatively sensitive to environmental stresses and in unfavourable conditions, so that it can easily be attacked by a variety of pests and diseases[1, 2, 5]. Roots may be attacked by mice and voles, and leaves by caterpillars of e.g. winter moth (*Operophtera brumata*), while the larvae of European cherry fruit fly (*Rhagoletis cerasi*) and the bird-cherry weevil (*Anthonomus rectirostris*) feed on the fruits[2, 5]. As most species of the genus *Prunus*, wild cherry is vulnerable to the gypsy moth (*Lymantria dispar*)[16, 17]. Infectious diseases may be cherry leaf roll virus (CLRV), bacterial cankers like *Pseudomonas syringae* or fireblight (*Erwinia amylovora*)[18]. Common foliar fungal pathogens are leaf scorch (*Apiognomonia erythrostoma*) and leaf spot (*Blumeriella jaapi*)[1]. Young wild cherry trees are especially susceptible to browsing by **ungulate** herbivores[2, 5].



Map 3: High resolution map estimating the **maximum habitat suitability**.

White flowers are insect pollinated.
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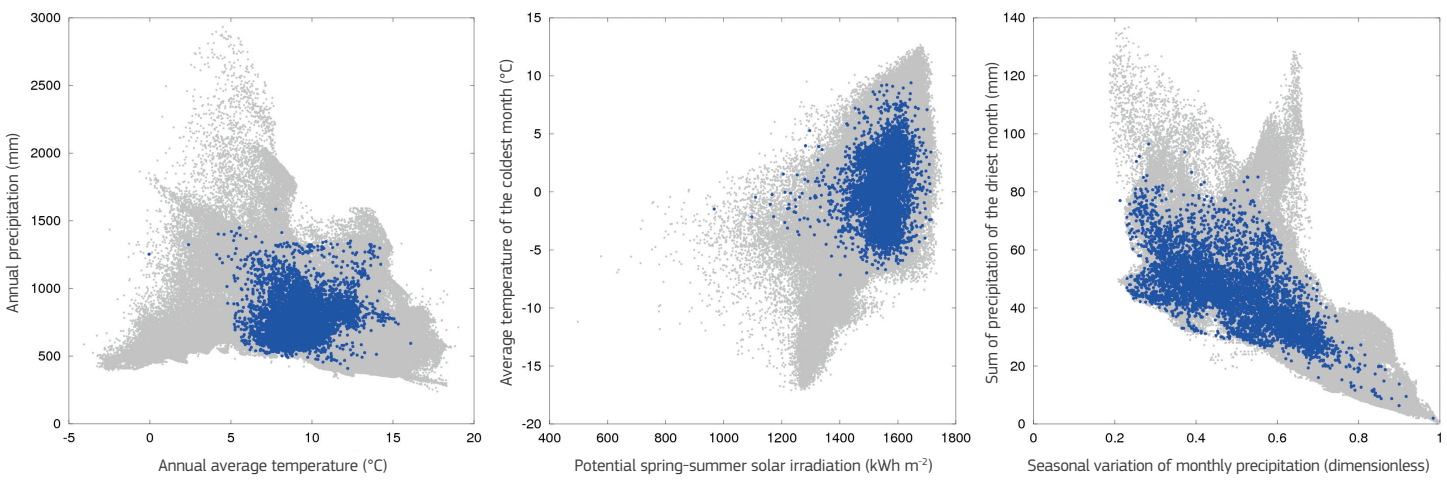
Field data in Europe (including absences) ● Observed presences in Europe ●

Autoecology diagrams based on harmonised **field observations** from **forest plots**.



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Cherres are ripe from late spring until summer and are dispersed principally by birds.
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